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rare earths, for one of which, should it prove to be an element, he proposed the name of Rogerum, in honor of our William B. Rogers.

Our Association has always been fortunate in its permanent secretaries. They have all been devoted to the interests of the organization and two of them held office for many years. The first permanent secretary was Spencer F. Baird, who was chosen to that office at the Cincinnati meeting in 1851, and continued as such until 1854, when he was succeeded by Joseph Lovering, who then filled the place until 1873, when he in turn was succeeded by the present retiring president, Professor Putnam. Lovering's valuable services were recognized by his election to the presidency in 1872, and he presided over the meeting held in Portland a year later.

MARCUS BENJAMIN.

U. S. NATIONAL MUSEUM.

(*To be concluded.*)

THE CLASSIFICATION OF BOTANICAL PUBLICATIONS.*

A RECENT number of SCIENCE,† in continuation of the discussion of the proposed international catalogue of scientific literature, to which space has been devoted in that journal for some months past, deals with the question of botany, and the article referred to must be considered as my excuse for the presentation to the Society of the following observations, which are intended solely as suggestions which, in part, may be helpful in starting the botanical portion of the proposed catalogue on lines which are likely to make it of the simplicity, coherence and general usefulness which all desire it to possess.

* Read before the Columbus meeting of the Botanical Society of America, and by request of the Society before Section G of the American Association for the Advancement of Science at the Columbus meeting.

† N. S. 10 : 46-8. Jl. 13, 1899.

In the article referred to, Professor Bessey has called attention to a paper prepared by the writer, some years since, for the Botanical Seminar of the University of Nebraska, which was intended to present before that body the results reached in the handling of a rather large library, the purpose of which is entirely botanical, applied botany and the arts based thereon of necessity being included. The subject now under consideration, while fundamentally the same as that handled in the unpublished paper referred to, is, however, practically quite different in the details of its management. In the paper referred to, the problem analyzed was that of the arrangement of a library which, devoted to botany, stood in isolation from other libraries, so that many works were of necessity included in it because of their bearing on botanical subjects, although in title and in some instances in substance not at all botanical. The subject requiring consideration in connection with the proposed catalogue, however, is that of a purely botanical library which may be supposed to stand in the closest possible connection with collections of works referring to all other branches of knowledge—or, stated otherwise, the botanical part of a general library—and is, therefore, in many respects a simpler one. The first mentioned can scarcely be so handled as to meet with the approval of general librarians or of librarians whose subjects are restricted but not botanical, because general knowledge and other sciences are of necessity warped therein that they may be bent to the requirements of the single specialty to which each book which finds a place on the shelves is subordinated. The second, on the other hand, calls primarily for a simple but logical classification of botanical knowledge, with provision for the insertion in it of a relatively small number of non-botanical works which are in such frequent demand as to call for the provision of a special copy

for the botanical library, in addition to that which would be found on other shelves.

It would at first sight seem quite unnecessary that the classification of botanical knowledge, or, for that matter, of knowledge in any department, for special library purposes, should demand consideration in connection with the preparation of any catalogue or the arrangement of the books on the shelves of any library, since the entire subject and its various parts have frequently been handled by people of large experience; but, as Professor Bessey has shown, the treatment of any specialty, and particularly of one in which development has been rapid and interest limited to a relatively small number of people, by a general librarian, to whom it is of minor importance since it represents only one small fraction of his field, is likely to be unsatisfactory to the student who wishes to enter into its minutiae, while, on the other hand, the classification of such special knowledge by a specialist is likely to be carried into such detail as to make it too complicated for general purposes.

The scheme which is submitted below is essentially the same as the purely botanical portion of the unpublished scheme referred to by Professor Bessey, with the modification of certain details which are not necessary for ordinary library purposes. While the attempt to adhere to any numerical or similar division of a subject is certain to be attended by so many inconsistencies as to make it undesirable to be biased by it, the convenience of a decimal arrangement is so great that in this scheme several subjects, which are really primary, have been divided so as to make nine principal topics, the subdivision of which, then, has been arranged into such a number of parts in each case as seemed desirable. It is to be understood that in the list subjects which are either mixed or of too indefinite a character to find place under subdivisions will naturally take

place under the general division to which they obviously pertain, and in each section the arrangement would be alphabetical by authors. As herein proposed, the scheme of topics would be stated as follows:

BOTANY.*

1. Works of miscellaneous contents, but of botanical interest, and treatises on several branches of botany.
2. Biographies of botanists, and collected writings of miscellaneous contents, whether purely botanical or botanical in part only.
3. Nomenclature, taxonomy and descriptive botany.
4. Morphology and organography.
5. Vegetable physiology, including ecology.
6. Vegetable pathology, including the injuries of plants and therapy.
7. Evolution, natural selection, etc.
8. Man's influence on plants, artificial selection, etc.
9. Phytogeography, floras, etc.

These general topics, for the purposes of any but the most special branch of botany, seem capable of logical subdivision in the way that is indicated below, without introducing a complexity beyond the endurance of anyone competent to handle a general library in which modern science is fairly represented, but any topic represented by only a few works can readily be left undivided until division becomes necessary. Where the number of works becomes too great for convenient handling in any ultimate division as here stated, the specialist, who alone will have occasion to handle a collection of the kind, can readily subdivide to any extent that he may wish; but it should be remarked that beyond the actual needs of subdividing any topic, such

* To bring this scheme into agreement with a resolution of Section G, recommending "as a basis for the classification of a botanical library, the decimal system now in common use in the United States," it is necessary only to designate 'Botany' as 580, and to prefix 58 to each numeral as here used: *e. g.*, 5.111 becomes 585.111, etc.

subdivision had best not be resorted to, since the larger the number of divisions the greater the probability of getting works, by accident, in the wrong class, and the greater the difficulty which the person not a specialist will experience in knowing where to look for any given work, unless the most rigid care is taken in shelf-marking the catalogue cards to the last degree.

BOTANY.

1. Works of miscellaneous contents, but of botanical interest, and treatises on several branches of botany.

1.1 General treatises containing more or less matter of botanical interest, when these find place on the botanical shelves.

1.11 Publications of societies, colleges, museums, etc.

1.111 Botanical gardens, parks, etc.

1.12 Journals, excepting those restricted to some single branch of botany.

These three classified geographically. In the library referred to, the geographical sequence used is that of Dewey's classification, and the numerals adopted to indicate it are the essentials of his geographical numerals as arranged, for example, under his 938-939, beginning with 38-9 Circum-Mediterranean region, including more than one continent, 40 Europe, to 99 Antarctic region, the minuteness of the subdivision of any given geographical area being made to conform to the number of works on that area possessed by a given library. It is evident, however, that the sequence adopted by Dewey is by no means a satisfactory biological sequence, and, were his system not in very considerable use, it would be far better to arrange a more logical sequence.

1.13 Text-books, lecture-outlines, etc.

Those restricted to special subjects would be sought under such subjects.

1.2 Dictionaries and encyclopædias.

1.21 Language dictionaries.

1.22 Encyclopædias, technical dictionaries.

1.23 Nomenclators, dictionaries of plant names, and purely botanical encyclopædias.

Botanical encyclopædias which are in the nature of synopses of the vegetable kingdom or certain of its parts would be sought in the special group, treated under Taxonomy.

1.24 Bibliographic aids of general contents.

1.25 Indexes to illustrations and exsiccatae.

1.3 Icones.

A convenient class for botanical gardens and the like, but, when used at all, comprising works which would generally be distributed among monographs, floras, journals, etc., with greater propriety.

1.4 Popular and economic botany.

1.41 Botany of literature.

1.42 General and miscellaneous economic botany.

1.421 Botany of agriculture.

Revisions of special groups of economic plants pertaining to this and the following entries might also be sought under Taxonomy.

1.422 Botany of horticulture.

1.4221 Fruits.

1.4222 Vegetables.

1.4223 Decorative plants.

1.423 Botany of forestry.

1.4231 Dendrologies, sylvas, etc.

Local floras would also be consulted.

1.42311 Winter manuals.

Other seasonal manuals, seedling manuals, etc., may be arranged as other subdivisions of 1.4231, if desired.

1.4232 Anatomical classification of woody plants.

1.42321 Strength and properties of timber.

1.424 Botany of pharmacy, food adulteration, etc.

1.4241 Poisons and toxicology.

1.4242 Mechanical effects of vegetable substances.

1.4243 Histological pharmacognosy.

2. Biographies of botanists, and collected writings of miscellaneous contents, whether purely botanical or botanical in part only.

3. Nomenclature, taxonomy and descriptive botany.

Under one or more of the divisions of this group it may be convenient to insert subdivisions for journals, proceedings of societies, etc.

3.1 Spermatophytes (Phanerogams).

The orders in numerical sequence, after Durand or Engler and Prantl.

According to the needs of different libraries a greater or less withdrawal of works from this group, for distribution under Ecology and other heads, is to be expected. Memoirs on fossil plants would find place here. Geological and geographical considerations would go under local floras or Ecology if placed on the botanical shelves.

3.2 Pteridophytes.

Subdivided after Engler and Prantl when desired.

3.3 Bryophytes.

Subdivided after Engler and Prantl in case of need.

3.4 Thallophytes.

Algæ, lichens and fungi are best recognized in a library arrangement, since no other scheme of classifying the thallophytes has yet led to the production of any considerable amount of literature based on such scheme.

3.41 Algæ and Characeæ.

3.42 Fungi.

3.421 Lichens.

3.422 Fungi in the restricted sense.

In some libraries this group will require division numerically, according to Saccardo's Sylloge or Engler and Prantl.

3.423 Yeasts and alcoholic fermentation.

3.424 Bacteria, germ diseases, etc.

3.425 Mycetozoa.

4. Vegetable morphology and organography.

4.1 External morphology, classification and description of plant members.

4.11 Morphology proper.

4.111 Thallus.

4.1111 Root.

4.1112 Shoot.

4.11121 Stem.

4.11221 Leaf.

4.1113 Types of branching.

4.11131 Inflorescence.

4.1114 Flower.

4.11141 Receptacle.

4.11142 Perianth.

4.111421 Calyx.

4.111422 Corolla.

4.11143 Androecium.

4.11144 Gynoecium.

4.1115 Fruit.

4.11151 Seed.

4.1116 Appendages.

4.11161 Trichomes, prickles, etc.

4.11162 Sori, sporangia.

4.11163 Archegonia.

4.11164 Antheridia.

4.11165 Embryo sac., etc.

4.11166 Pollen, pollen plants.

For this entire subject Anatomy, Physiology, and the several groups under Taxonomy, would be consulted. Subdivisions may easily be made when required.

4.12 Embryology.

With frequent reference to development, germination, etc.

4.13 Organography.

Subdivided like Morphology.

4.131 Nomenclature of color as applied to plant description.

General treatises on color would, of course, be sought under physics.

4.2 Vegetable anatomy and histology.

4.21 Laboratory manuals, technique, microscopy, photomicrography.

Subdivided if necessary.

4.22 Cytology.

4.221 Cytology.

4.2211 Protoplasm.

4.2212 Plastids.

4.2213 Nucleus.

4.222 Cell contents.

4.223 Cell wall.

4.23 Histology of plant members.

Subdivided at will, like 4.11.

4.231 Histological classification of plants.

See also Botany of forestry, Botany of pharmacy, Taxonomy.

4.3 Teratology.

Deformities and injuries caused by insects, fungi, etc., would be sought under these heads, and under Vegetable pathology.

5. Vegetable physiology.

5.1 Physiology proper.

5.11 Vegetative processes.

5.111 Absorption and conduction of fluid.

Dew plants, rain plants, carnivorous plants, etc., would be sought under Ecology.

5.112 Transpiration.

The phenomena of so-called frost plants, etc., also conveniently classed here; the protective function of stomata, perhaps, under Ecology.

5.113 Plant food, nutrition.

5.1131 Photosynthesis.

5.1132 Metabolism, respiration, secretion.

5.1133 Nutrition.

5.114 Growth, protoplasmic activity.

5.1141 Turgescence.

5.1142 Growth.

5.11421 Circumnutation.

5.1143 Development.

5.1144 Cell division.

Much cytological matter, of necessity, under histology.

5.1145 Protoplasmic movements, irritability.

5.11451 Heliotropism, geotropism, hydrotropism, etc.

See also growth.

5.1146 Germination.

See also 4.11151, 4.12, and 5.1143.

5.12 Reproductive processes.

5.121 Vegetative propagation.

Subdivided, when desired, either on morphological lines or by plant groups. Morphology, Organography and Ecology would be frequently consulted here.

5.122 Sexual reproduction.

5.1221 Differentiation of sex.

5.1222 Heterospory, alternation of generations.

5.1223 Fecundation.

5.1224 Reproduction of Thallophytes

5.12241 Conjugation.

5.12242 Oophytic fertilization.

5.12243 Carpophytic fertilization.

5.1225 Reproduction of Archegoniatae.

5.12251 Bryophytes and Pteridophytes.

5.122511 Antherozoids.

5.122512 Egg cells.

5.12252 Gymnosperms.

Subdivided like preceding.

5.1226 Reproduction of Siphonogamæ.

5.12261 Pollen and pollen plants.

5.12262 Ovules.

General morphology, Embryology, and Germination, to be consulted.

5.2 Ecology.

5.21 Vegetative interrelations.

5.211 Phenology.

5.212 Nutritive adaptations.

5.2121 Plankton, aquatics, ice plants, dew plants, etc.

5.2122 Climbing plants.

5.2123 Carnivorous plants.

5.2124 Parasites, symbionts.

5.213 Protective adaptations.

5.2131 Compass plants, epiphytes, halophytes, xerophytes, sleep of plants, etc.

Chloroplast movements and the protective adjustment of stomata would be sought under Physiology proper. This may be subdivided as needed.

5.2132 Spines, secretions, raphides.

See also 4.11, 4.222, and 5.1132.

5.2133 Myrmecophilism, acarophilism.

5.22 Reproductive interrelations.

5.221 Pollination.

5.222 Dissemination.

6. Vegetable pathology including the injuries of plants, and therapy.

7. Evolution, natural selection, etc.

8. Man's influence on plants, artificial selection, etc.

Economic botany would be consulted here.

9. Phytogeography, floras, etc.

9.1 Geographical botany.

Ecological considerations would be sought under Physiology.

9.2 Floras.

Subdivided, according to abundance in each area, geographically like periodicals, etc. Travelers' journals of restricted scope, and similar works directly or indirectly throwing light on a local flora, reports of geological surveys, and even local maps and guide books, in a botanical library are brought together here for convenience in use. Fossil floras excluded from taxonomy would find place here.

WILLIAM TRELEASE.

MISSOURI BOTANICAL GARDEN.

ON THE CAUSE OF DARK LIGHTNING AND THE CLAYDEN EFFECT.

I HAVE been criticized in a letter which appeared recently in *Nature* for not alluding in my letter on dark lightning to the peculiar photographic reversal known as the Clayden effect. I must confess that at the time of writing my letter I was unaware of this effect, a description of which has only appeared, so far as I know, in one of the photographic journals. Mr. Clayden has certainly explained dark lightning, and it only remains to explain his explanation. As I think that this effect is not generally known, I believe that it may be worth while to devote a few words to the statement of the case, before describing the experimental work by which I have determined the factors which play a part in this very curious photographic phenomena.

Mr. Clayden showed that if a plate, which had received an impression of a lightning flash or electric spark, was subsequently